

bridge, for example, the variation due to the effect of temperature amounts to 3 feet vertical at the center each year. The river span also rises and falls each day under diurnal variation of heat and cold. The iron work of the bridge is practically in four parts, and when they expand with the heat the parts slide one past the other and thus correct what otherwise might prove a serious fault.

Peculiar climatic conditions often promote the corrosion of metals, and this effect may be induced by moisture or atmospheric electricity, or conditions that favor *development* of electrical action in the metal parts.

The heaving effects due to frost in the ground must be allowed for in all construction work, particularly in the foundations of bridges and trestles. This is determined by the character of the ground and the severity and frequency of low temperatures and the length of the winter period.

In cases of expected heavy rain, snow, sleet, windstorms, or floods, traffic is regulated accordingly, and weak points along the line are patrolled even more rigidly than usual in order to avert possible washouts or broken rails, or give timely warning should such a calamity actually occur.

When a severe cold wave is anticipated, consignments of perishable goods may be either refused or carried at shipper's risk, or heaters are provided for the cars, or they are round-housed, or perhaps the goods may be either immediately removed from the car, or transferred to another and safer type of car. At such times the weight and length of trains must be diminished, as the steaming efficiency of an engine is less in cold than in warm weather.

For many years, during cold weather, particularly near the close of the navigation season, the shippers of iron ore in this section have experienced more or less trouble on account of frost penetrating the ore.

When freezing occurs the best known expedient at present is to thaw the ore by steam, and that is necessarily an expensive and tedious process. Besides frozen ore also means aggravating delays in the loading of vessels. The delay of a few days now and then means the loss of a trip or two and consequent financial loss to the vessel operator, while if a large number of boats miss a trip or two in a season because of such trouble the results might be far-reaching.

Some three or four years ago the writer conceived the idea that this matter was, to some extent, capable of better regulation as far as the weather was concerned, and with that end in view the subject has been very carefully studied. From a rather crude arrangement at the start the scheme has been so elaborated and expanded that at present forecasts in considerable detail as to temperatures and storm conditions are daily furnished each ore dock and each ore railroad superintendent, as well as the principal mining companies.

The aim has been to make the forecasts as reliable and as useful as our capabilities and utilities will permit, endeavoring to so gage the forecasts and their distribution as a cooperative feature that the railroads can have plenty of manageable ore at docks during a mild spell in the frost season, while during very cold and stormy weather to aid them through this information in maintaining a nice balance between the mines and docks as regards sufficient fresh and relatively warm ore at docks or en route to meet vessel tonnage, and to keep down to the very lowest minimum the necessity of steaming, by curtailing shipments to docks during unusually critical periods. Storms, you know, sometimes delay expected vessels, and that in itself sometimes results in much mischief; for if the weather is cold enough this miscarriage of schedule may result in train loads of frozen ore.

During the critical period of this last season, the ore handling problem was generally worked out very satisfactorily as regards dispatch. This, of course, is due to increased perfection in railroad organization and equipment. From my own

standpoint I think those engaged in this trade are to be congratulated on their intelligent application of the weather forecasts, for many of the situations that at times confronted them required the very highest quality of business judgment and quick action to forestall the elements.

It is not claimed that the scheme is yet perfect, nor that our forecasts are infallible, but we hope to effect improvements from time to time, and, if possible, keep pace with the wonderful development of this traffic so far as the weather is concerned. If, instead of your having to thaw 5 per cent (or whatever the average figure has been) of all the ore shipped in the frost season, we can assist you to reduce that to 2 per cent (an allowance chargeable to storm-delayed vessels, railroad schedule interruptions, or weather forecast errors), we shall surely feel justified in believing that we have rendered you a service.

An arrangement that would effect a considerable improvement locally would be the creation of what one might term a railroad-weather clearing house. That is to say, one or more railroad officials at selected points might be designated to whom we could telephone our daily forecasts and warnings, these officials or employees in turn to distribute the information to other offices. In this way a large area could be quickly and efficiently covered. Through the courtesy of Mr. McGonagle this method is already in operation in the Wolvin Building.

Both the Duluth & Iron Range and the Duluth, Missabe & Northern railroads telegraph the daily forecasts and warnings to their important stations. This feature might be adopted with advantage by all the other railroads in this section. It would more than pay for itself in connection with railroad operations and convenience to people along the line.

LEGAL DECISIONS AS TO CYCLONES.

We have already had occasion to publish several legal decisions bearing on the work of the Weather Bureau or the use of meteorological terms. In a recent article on insurance we especially urged that if a policy is to protect one's property from wind, lightning, waves, or other meteorological phenomena, then the fact should be explicitly stated without any reference to cyclones, tornadoes, hurricanes, thunderstorms, or any other general meteorological terms. The importance of this caution is well illustrated by the extensive and expensive suit, resulting in an appeal to the United States Circuit Court of Appeals, Eighth Circuit, for the District of Minnesota, May, 1906.

We copy the following opinion in this case, No. 2375, in full from the official records of the circuit court as delivered by Judge Philips, May, 1906.

The Maryland Casualty Company, plaintiff in error (hereinafter for convenience designated the defendant), issued its policy of insurance to the defendants in error (hereinafter for convenience designated the plaintiffs), for a term of one year beginning the 7th day of June, 1904, and ending June 7, 1905, whereby the defendant insured the plaintiffs—

“against direct loss or damage to property owned by the assured and described in the said schedule and also for loss from liability of the assured for damage to merchandise held in trust or on commission or sold but not delivered by being removed, situate on that part of the premises occupied by the assured as described in said schedule, and caused, during the term of this insurance, by the accidental discharge or leakage of water from the automatic sprinkler system now erected in or upon the building occupied wholly or partly by the assured * * * ; but the total aggregate liability of this company hereunder shall in no event exceed \$25,000”.

The policy, however, was made subject to certain specified

conditions. The ninth condition, which is the subject matter of this controversy, is as follows:

"This policy does not cover loss or damage resulting from any leakage occurring at any point outside of the inner surface of the cellar floor or walls; nor resulting from the explosion, rupture, collapse or leakage of steam boilers or steam pipes; nor resulting from any interruption of business or stoppage of any work or plant; nor resulting from freezing; nor resulting from fire or violation of law; nor resulting from or caused by the willful act of the assured, nor by the neglect of the assured to use all reasonable means to save and preserve the property insured hereunder; nor resulting from or caused by invasion, insurrection, riot, civil war or commotion or military or usurped power, or by order of any civil authority; nor resulting from or caused by earthquakes or cyclones or by blasting or explosions of any kind, or by the fall or collapse of any building or buildings, or part thereof."

On the 20th day of August, 1904, between 8 and 9 o'clock p. m., the city of St. Paul was visited by a windstorm which did injury to the plaintiffs' building, breaking the pipes of the automatic sprinkler, whereby the goods in the store were flooded by the freed water, doing damage to an extent of over \$25,000. For the recovery of this alleged loss suit on the policy against the defendant was brought. To this action defendant interposed the principal defense that said injury resulted from a cyclone, and was, therefore, excepted from the operation of the contract of insurance. On trial to a jury the plaintiffs obtained a verdict in the sum of \$26,225, for which judgment was rendered, to reverse which the defendant prosecutes this writ of error.

The controlling question presented for determination is whether or not the windstorm occasioning said loss was a cyclone within the meaning of the policy. A brief summary of the work of that storm will disclose its character.

The cloud which contained its fury was first observed by Professor Whitebreicht, the head of the Mechanics Arts High School of the city of St. Paul, who was at his cottage at Lake Minnetonka, about 35 miles from St. Paul. He testified that between 8 and 9 o'clock p. m. of August 20, 1904, his attention was directed to the threatening clouds, which he described as a "great large cloudy-mass, balloon in shape, and coming down to a decided point at the bottom, as observed from the lake, to the southeast of the portion we were occupying". It moved down the lake toward St. Paul and was apparently moving with the wind, and without evidence of revolution; "it was an oblong balloon, decidedly oblong, with a pendant". He testified that it struck his house, broke a large pane of glass, 30 to 40 inches square, removed the frame work of the screens, driving one with such force against a table as to punch a hole in it. It blew down the chimney of his house, and a maple tree eighteen inches in diameter, taking off the whole top and taking it 60 feet diagonally across the cottage without striking the roof. It blew in the windows and took off the roof of an adjoining cottage; turned a large barn around at an angle of 45°, taking off the roof and scattering the contents.

When it reached the vicinity of the city of St. Paul it carried out spans of the steel and iron bridge spanning the Mississippi River, precipitating them to a considerable distance, and did great damage to trees and houses on an island in the river. It struck the city at the north bank of the river, and its general course, with some eccentric divergencies, was from southwest to northeast, covering a pathway of 300 feet or more in its sweep. Near the river the destructive force of the storm made its first impression upon the city. It blew from a railroad track and overturned box cars. It wrecked the Imperial Theater and demolished the Tivoli Concert Hall, killing some people therein. In its pathway through the city it smashed windows of various sizes and strength, blew down signs and took off cornices from buildings, scattering their fragments

in large quantities over the streets. At Third street it raised and dropped a sky light 50 feet square which covered the open court of the Pioneer Press Building; blew in its windows on the Fourth street side, creating some consternation among the inmates of the building. It unroofed the Davidson block at the corner of Fourth and Jackson streets. It leveled to the ground the freight depot of the Chicago, Milwaukee & St. Paul Railway. At Smith Park it broke, blew down, and uprooted a large number of trees. It carried off the top of the brick building occupied by a wagon company, the roof of which, after being blown off, dropped back on the remaining building. At another place in the vortex of its pathway it took out a section of the wall of a brick building. On the next street it wrecked into fragments a frame church building. In Lafayette Park chimneys were toppled over, some buildings were demolished, and trees in and about the park were broken and uprooted. It is true that the evidence tended to show that most of the trees about the park were comparatively young and those blown down were easily restored in place by the park commissioner. On the hill farther on the destruction to houses and property was marked. In places sidewalks were lifted up on either side of the street and tumbled in mass in the center of the street, showing the eccentric motion of the wind. One sidewalk was lifted into the air, carried over a stonewall fence, and deposited a hundred feet or so in a yard. Telephone and telegraph poles of great size and strength were blown down, broken off, and twisted in different directions. One house, as shown by a photograph in evidence, was blown diagonally around, entirely off of one corner. Some of the trees, broken or twisted off and uprooted, were of large size and apparent great strength.

While it is to be conceded that the direction in which the trees fell was generally in that of the storm, yet as evidence of its concentric motion trees standing in opposite positions fell with their tops together. The limbs of trees had the appearance of being twisted off.

As indisputable proof of the effect wrought by this narrowly confined windstorm, the street, park, telegraph, and telephone inspectors and repairers were all out as early as the light of the next morning would admit to look after the injury done on their respective lines and beats. So piled up were some of the streets with debris, trees interlaced with tangled telephone and telegraph poles, that at places the inspectors were unable to drive through the streets, according to their testimony.

This storm was traced some twenty miles or more beyond the city, and its energy and violence were marked in the throwing down of fences, the breaking of trees, and demolition of or injury to buildings.

As a circumstance indicating its alarming character, and as evidence of the impression it made upon their minds, newspaper men in their respective offices were thrown into excitement, and as soon as the storm sufficiently abated reporters went out in the night and early the next morning to observe its work of desolation, and so impressed were they with its character that all the newspapers of the city, perhaps with one exception, the next day in their issues described the city as swept by a cyclone of great violence. Conceding the criticism of plaintiffs' counsel that newspaper reporters may be given to sensational exaggeration, the fact remains that the storm was of such a character that notwithstanding what may be assumed to be their city pride to have the outside world understand that their beautiful city was immune from things that maketh afraid, they did publish the alarming impressions made upon them by the storm.

Superadded to all this is the testimony and the report of Mr. Oliver, in charge of the Weather Bureau at the city of St. Paul. After an examination of the work of this storm in the city he sent in his report to the Department at Washington. In the official report he stated that a heavy rain began during

the morning before, attended with thunder; that it was clear early in the forenoon but at 10 a. m. it became cloudy; at 7:45 p. m. a thunderstorm began without any noticeable premonition except that the air was quite sultry; that the clouds were of a yellowish tinge; and it assumed proportions of a severe storm at 9:45 p. m. The wind blew at a rate of 90 miles per hour from the northwest; and at 9:52 p. m. the anemometer and wind-vane supports were blown down, which ended further registration of the direction and velocity of the wind. The receiver and cover of the rain gage were blown away. The storm, which was about two and one-half miles in length and about 300 feet in width, entered the city from the southwest, destroying two spans of the high bridge; crossing Harriett Island, on which are located the public baths, it did much damage to shade trees and parts of the building. He then stated the damage to the Tivoli Hall and Empire Theatre, as heretofore stated. His report continues as follows:

"The storm then moved in a northeasterly direction across the business portion of the city, doing damage to business blocks, breaking glass, unroofing buildings, uprooting and breaking shade trees in two of the public parks and along the streets; some dwellings and school houses and churches in the line of the storm were either entirely destroyed or greatly damaged.

"The distribution of débris along the path of the storm and the direction of the uprooted trees, especially in the parks, clearly showed the presence of a whirl. The wind in passing evidently rose above some portions of the city in its path, doing slight damage, then descending to the earth with its besom of destruction.

"There was some hail about the size of a pea from 9:48 to 9:52 p. m. The lightning was constant and vivid. The estimated value of the property destroyed is \$500,000. The following persons were killed: Hocanson, Louis F., 586 Brunson street, killed at Tivoli; Kventon, Geo., 579 Toronto avenue, killed at Tivoli; Robinson, Viola, killed at House of Good Shepherds. * * *

"The barometer did not indicate any inordinate disturbance of the air during the afternoon and evening, but at about the time the storm struck it fell very suddenly, the barograph indicating a fall of from .75 to .24 in a very few minutes".

He then proceeded to give the readings of the barograph and the examination of the anemometer after the storm, and stated that the last register which the wind gage made was *160 miles an hour*. He had been upon like duty at various places in Texas, and at Vicksburg, and at Louisville, Ky., and had given constant attention to the subject of meteorology, and had observed many windstorms; that the velocity of this windstorm was the highest he ever saw. In respect of his examination of the condition of the city after the storm, he testified that the débris along its path lay in all directions, and that trees were uprooted and blown over, and on the northeast side of Lafayette Park they were pointed southwest and on the southwest side they were pointed northeast.

The plaintiff's building, which was a large structure of great strength, the evidence shows was stricken with such violence by the storm that strong windows on the sides of it were blown in. It blew down the tower from the building, dislocated and ruptured a pipe in the automatic sprinkler attached thereto, and carried away two skylights out of the west end and ruptured a pipe of the sprinkler beneath. The wind blew through the windows, dislodged, with such force as to lift from the racks, boxes of goods and lay them on the floor, breaking the sprinkler pipe which lay in front, thus flooding the floor with the discharged water, causing the damage claimed.

The evidence in rebuttal was principally directed to an effort to minimize the extent of the destruction to property and to show that the trees blown down about the park and elsewhere were small, and that some of the buildings destroyed were in

a more or less dilapidated condition; that buildings of stone and brick structure of great strength were not materially injured. But the evidence shows, without any material contradiction, that trees 18 inches in diameter were destroyed, and that buildings of ordinary strength, serviceable for human habitation and for business, were demolished and others greatly injured.

At the conclusion of the evidence the defendant made request for an instructed verdict, which was refused.

In its charge to the jury, the court, touching the issue as to whether the storm in question was a cyclone, made the following declaration:

"Now, I don't think that anybody would say that a cyclone was a gentle storm; on the contrary I think a cyclone would be said by anybody to be, and is usually known, and is usually understood as being, a very severe and destructive storm. It is a storm characterized by certain peculiarities and characteristics, marking it as a cyclone. If we look into the dictionaries, we find that this word is derived from the Greek, the noun being *kuklos*, a circle, and the verb being *kukloein*, to move in a circle, or to move around, or to whirl around. I not only think that a cyclone has the characteristics of moving in a circle in the minds of the lexicographers and scientists, but it also has that characteristic according to the usual and ordinary and common acceptance of the term. And the atmosphere not only moves in a circle in a cyclone, but this circularly moving atmosphere also has progressive motion, of greater or less velocity, usually of a very considerable velocity, and sometimes going to the extent perhaps of 20 or 30 miles or more per hour in its onward movement. So that I think, boiling it all down, we can define a cyclone as being a violent and destructive storm of greater or less extent, sometimes its path covering only a narrow strip and at other times covering a vast and wide strip, characterized by high winds rotating about a center of low atmospheric pressure, and this center moving onward, with greater or less velocity, sometimes at a very great velocity, at others at only an ordinary rate. I think the principal force of the wind in a cyclone is in the circular motion.

"Now, the scientists seem to distinguish between a cyclone and a tornado. Both are characterized by high winds rotating about a center of low atmospheric pressure. In the cyclone, according to scientists, the area of the rotating wind is much greater than that of the tornado, this area in the cyclone being sometimes many miles in diameter, and sometimes even hundreds and thousands in diameter; whereas in a tornado the diameter of this area is smaller, being often, and I think I may say usually, only a few hundred or a thousand feet. But I think under the usual and ordinary acceptance of the terms, cyclone in its usual and ordinary acceptance and tornado in its usual and ordinary acceptance are synonymous, a tornado being a small cyclone. And if it was a cyclone at all, why then the word cyclone of this policy covers it. The distinguishing characteristic of the cyclone or tornado is that of high winds rotating about a center of low atmospheric pressure, and this center moving with greater or less velocity across the country. Now that seems to me to be what a cyclone is, and I so charge you."

Further on the court said:

"I don't think there can be any question that this was a severe, violent, and destructive storm, counsel for the plaintiff has stated so much himself; but that, gentlemen, is not enough—to establish a violent and destructive storm—that is not enough. It must also be shown that this storm had the peculiar characteristics of a cyclone, that it was what we would call a whirling storm, and that it came within the definition I have given you of a cyclone. If you believe from the evidence that it was a cyclone that ends the case".

Finally the court said:

"Of course you can have cyclones of varying strengths. I think a cyclone must be a violent and destructive storm, but it can be of various degrees of violence and destructiveness; it must be a violent and destructive storm and it must be in addition characterized by high winds rotating about a center of low atmospheric pressure and this center moving onward with greater or less velocity. It could be a cyclone without being an extremely severe cyclone".

Reduced to its ultimate analysis, before the jury were authorized to find for the defendant on this issue they were required to find from the evidence that this windstorm, no matter how terrific and destructive, must have possessed the distinctive quality of moving in a circle, rotating about a center of low atmospheric pressure, this center moving onward across the country; that it must be a "whirling storm".

As this storm occurred in a night of intense darkness, driving people who might be out doors under cover, and forbidding those within doors to venture out, exactly how the defendant was to meet by evidence the requirements of the given phenomena and characteristics imposed by the charge, is not apparent. It is quite inconceivable, in view of the evidence in this case, that the jury should not have returned a verdict for the defendant except for the fact that the storm was not seen with the eye to fix on it the peculiar characteristics indicated by the technical charge of the court.

In the very nature of the situation, the character of the storm could only be judged of, after it ceased, by observing its effect. In the effects were furnished at least persuasive evidence that this storm, in its origin and ravages, possessed the essential "whirling" movement.

Looking alone to the derivative of the word "cyclone" and its technical import, in the conception of meteorologists and scientists, it may be conceded that one of its characteristics is the presence of a circular or gyratory motion, evidenced by a twisting effect. Looking to the dictionary definitions, which are not in many instances reliable sign boards for legal construction of contracts, they are substantially as follows:

CENTURY DICTIONARY: "Any atmospheric movement, gentle or rapid, general or local, on land or at sea, in which the wind blows spirally around and in toward the center".

STANDARD DICTIONARY (1895): "An atmospheric disturbance extending over an area of 100 to 500 miles in diameter, characterized by decrease of barometric pressure toward center and by winds directed spirally inward; in some features opposed to anticyclone".

NEW ENGLISH DICTIONARY: "Meteorol. A system of winds rotating around a center of minimum barometric pressure, the center and whole system having itself a motion of translation, which is sometimes arrested, when the cyclone becomes for a time stationary".

WEBSTER'S INTERNATIONAL DICTIONARY: "A violent storm, often of vast extent, characterized by high winds rotating about a calm center of low atmospheric pressure. This center moves onward, often with a velocity of twenty or thirty miles an hour".

Vol. V, Encyclopedia Americana, gives a brief résumé of the origin of cyclones, which is by no means helpful.

Turning to the discussion of scientific men or meteorologists, it will appear that the movement of all winds is more or less circular, and that cyclones in their technical sense are not usually harmful, and are not destructive until they assume the quality of a tornado, denominated by them as "the child of the cyclone".

While it is to be conceded that where an insurance contract is so drawn as to be ambiguous and susceptible of different constructions, so that men of average intelligence might reasonably attach different meanings thereto, the court will apply that construction to it which is most favorable to the assured.

"But the rule is especially well settled that contracts of insurance, like other contracts, are to be construed according to the sense and meaning of the terms which the parties have used, and if they are clear and unambiguous, their terms are to be taken and understood in their plain, ordinary, and popular sense". (*Imperial Fire Insurance Co. v. Coos County*, 151 U. S. 562.)

It will be observed that in the ninth paragraph, excepting the insurer from liability, it does not cover loss or damage resulting from freezing or fire, "nor resulting from nor caused by earthquakes or cyclones or by blasting or explosions of any kind, or by the fall or collapse of any building or buildings, or part thereof". Applying the rule *noscitur a sociis* in searching out what must have been in the mind of the parties in the employment of the word "cyclone", there can not be any reasonable doubt that it was the purpose not to apply the insurance to loss or damage resulting from violent causes arising outside of the building where the automatic sprinkler was installed, such as blasting, or explosions, or earthquakes, or cyclones. It excluded injuries from blasting or explosions because it was well known that such external force is well calculated to so shake the building as would probably disturb and dislodge the sprinkler and cause the water to escape therefrom. It excepted earthquakes because of the known fact that they were calculated to jar the building, and probably dislodge the sprinkler and turn loose the flood of water. In the same connection occurs the word "cyclone". Inasmuch as it is common knowledge that windstorms of abnormal force or violence may so shake or topple a building as to effectually disturb an automatic sprinkler in place therein, the inquiry naturally arises, why should the parties to this contract be held to have had in mind that unless the windstorm possessed the peculiar quality of a circular, twisting motion in its sweep, so as to bring it within the technical or scientific derivation of the word cyclone, it should not come within the compass of this exception from the policy?

It is a conceded fact among etymologists, as well as matter of common learning, that words have their development and enlargement, so that in time they are used and understood among the people if not in an entirely different sense, yet so as to express and comprehend a broader application than was implied in their origin. And, therefore, they undergo in lexicography the changes attached to them in common parlance. The law in its flexibility, constantly adjusting and adapting itself to new conditions as they arise, declares that words and phrases employed in business transactions in ordinary dealings among men, shall be deemed to have been employed in their popular sense and acceptance, unless it clearly appears that they were intended to be used in their technical or more restricted sense. It is hardly to be presumed that the average merchantman and insurance agent who make these insurance contracts ever heard of the Greek word from which the term cyclone is claimed to have been derived, or that they possess any technical knowledge, or had in mind the characteristic of "high winds rotating about a center of low atmospheric pressure, and this center moving onward". But they do know the common history of the day, that in States west of the Mississippi River, like Missouri, Kansas, Nebraska, Iowa, and Minnesota, there are what are popularly known as cyclones, occurring in the spring or summer months, recognized as windstorms of great velocity and destructive violence, as distinguished from ordinary windstorms known as furious or noisy gales, but not attended with extraordinary destruction of life and property. They do know that in such regions windstorms are designated as cyclones, which, passing through a narrow strip of country, more or less confined, with such resistless force as to twist, break, and uproot trees, unroof and turn over houses and destroy property in their march, more or less eccentric in their movements. It is not too much to say that this

designation is one of common acceptance among the people.

Scientific writers, like Mr. John Elfreth Watkins, in the *Technical World* of February, 1905, while speaking rather derisively, bears testimony to the fact of this designation of the term cyclone among the people. He said:

"A roaring, snapping, death-sowing funnel-cloud looms up in the sky, descends to earth, ploughs through life and property for a mile or two, ascends into the air whence it came, and passes off. Ten to one the newspapers will state that a 'cyclone' visited the affected region. It all results from our eternal, inveterate habit of sticking to wrong names—for example, 'locust' for *cicada*, 'buffalo' for *bison*, and other misused terms that might be cited".

Had the policy employed the words "violent windstorm" it would in practical application have been inexpressive and vague. Had it added the word "destructive" it might have been too narrow for the assured and too liberal for the insurer. But in the use of the more generic term "cyclone", in its up-to-date significance, it clearly enough expressed and included that character of windstorm distinguished by its concentrated force and violence, so resistless as to make it especially destructive in its narrow pathway to property like buildings.

Under the construction contended for by the learned counsel for plaintiffs, and as expressed in the charge of the court, had this windstorm come, like an avalanche of mighty waters, against the plaintiffs' building and crushed it like an egg shell, as it did buildings of lesser strength, yet the insurance company should be held for damages, unless it should be shown that "in addition, it was characterized by high winds rotating about a center of low atmospheric pressure and this center moving onward with greater or less velocity, etc."

The spirit of the common law is the instinct of practical sense. Courts are most apt to approximate absolute justice in construing a controverted term in a business contract, like the one under review, by giving to it a practicable comprehensible application, rather than one so technical and theoretical as only to obscure and mystify. "For the letter killeth, but the spirit giveth life". The failure to observe this, in seeking to solve the import of the term "cyclone", as employed in the ninth condition of the insurance contract, doubtless furnished the jury the only conceivable pretext for finding the issue for the plaintiffs.

Reversing the situation: Had the policy contract insured against loss resulting from a cyclone, the insurance company defending on the ground that the windstorm in question was not a cyclone, can it be imagined that the same jury would not have found the issue for the plaintiffs, had they not been confused or felt coerced by the charge of the court imposing the necessity of direct proof of the presence in the wind of the technical qualities of a meteorological definition?

There being no disputable evidence on which reasonable minds ought to differ as to the windstorm being of the popular conception of a cyclone, as that term was employed in the policy, the court should have granted the request of the defendant for a directed verdict. The judgment of the Circuit Court is, therefore, reversed, and the cause is remanded with directions to grant a new trial.

THUNDERSTORMS AND SQUALLS.

The Editor regrets that time and opportunity have not allowed him as yet to make a résumé of our steady progress in the knowledge of the origin and mechanical phenomena attending squalls and thunderstorms. This is a matter that has been especially developed of late years by M. Durand-Gréville. We should be very glad if some one of our physicists would contribute to the *MONTHLY WEATHER REVIEW* a review of the work that has been done along this line of study, beginning with Espy's reports and maps of 1836. Thus for a long time we have known in a general way that thunderstorms occur

principally on the south and east sides of an area of low pressure, that in fact they represent the front of a slowly descending mass of air moving northeastward and underrunning and lifting up the air near the ground, just as the cold blizzards represent slowly descending air moving southeast, on the western side of a central area of low pressure. The blizzard is a winter phenomenon while the thunderstorm is a summer phenomenon. But Durand-Gréville has added to our knowledge by showing that in every thunderstorm and squall we have a ribbon (ruban) of isobars squeezed close together, so that the isobaric chart reminds one of the graining in the surface of a beam of wood "quarter-sawed". In fact the ancient usage of French mariners is to speak of a "squall of wind" as a "grain", altho we know not the etymology of this French word. Durand-Gréville has for many years made a special study of the isobars attending these wind squalls or grains. The last paper by him was presented to the recent international competition in the prediction of the weather (Liege, 1905), and is published in full in the bulletin of the Belgian Astronomical Society, for March and June, 1906. Apparently there are very few instances in which squalls can not be foreseen by one who follows up this line of study. The memoirs by Durand-Gréville remind us of the following paper published long since by Dr. Gustavus Hinrichs and Prof. Frederick Starr.

In a first paper on the thunderstorms of Iowa, published in the *Proceedings of the Davenport Academy*, December, 1887, Vol. V, pages 81-99, Prof. Frederick Starr, Ph. D., of Coe College, Cedar Rapids, entered on his special study of thunderstorms for that State. Altho he had only 54 reporters for the first summer yet many interesting features were brought out. Doctor Starr stated that he was not "a professional meteorologist", but he had "a great desire to see Iowa thunderstorms carefully studied", and believed it to be a subject that would repay diligent work. We fully agree with him in this latter belief, and hope that someone may collate and analyze the data that have been published for that year, and that in fact one will be found to make special studies of the origin and development of thunderstorms in each section of our country. Just as soon as such a study has been made in the region within 50 miles around any large city it should be possible to invert the problem, and from the beginning predict whether or no the thunderstorm will in a few hours trouble that city.

We quote the following paragraphs from Doctor Starr's first paper:

Three kinds of thunderstorms seem to be reported—

First.—Storms, well defined, traveling from the west, or a western quarter, toward an eastern quarter. Time records, properly made, supply data for calculating the rate of progress eastward. These are apparently connected with the general atmospheric circulation of the United States, and occur in the southeast quadrant of a "low" area.

Second.—Heat storms, local in character; not showing a progressive movement; often unaccompanied by any wind; seldom beginning until 4 p. m. in the afternoon, or in the evening, followed by a later instalment in the early morning. They accompany extremely hot weather.

Third.—"Squalls", which are well characterized by Doctor Hinrichs in his "Pulletins" for June and July, 1882. His account has been quoted by others, but may again be copied here for Iowa readers.

"Our Iowa squalls are as serious as any on the ocean; the wind may be destructive, but it is not lifting or revolving as it is in the tornado. Roughly speaking, the squall may be likened to an extended tornado, having its axis parallel to the ground. Here, in Iowa, it generally bursts upon us from the northwest, following the southeast wind; it rolls over and strikes down upon us, usually with abundant precipitation, and soon is succeeded by the same southeast wind which it so abruptly displaced. So far as I have studied them, they come down from the northwest, progressing at the rate of 20 to 50 miles an hour. In northeastern Iowa the storm front has a tendency to bend up, so as to make the squall more nearly from the west. In like manner in southwestern Iowa its front bends westward, and hence blows more nearly from the north. The storm front is fierce in its power along a considerable distance—20 to 50 miles or more, in its front, along the earth, are struck simultaneously. As the great storm front moves on, it can be traced for 350